Peertechz


Medical Group

Journal of Cardiovascular Medicine and Cardiology

DOI:http://dx.doi.org/10.17352/jcmc

ISSN: 2455-2976 CC By

**Muzaffar Ali[1]*, Muhammad Umer[1], Usman Mahmood Butt[1], Shahzad Tawwab[1], Mamoon Akbar Qureshi[2] and Zubair Akram[2]**

[1]Department of Cardiology, Allama Iqbal Medical College/Jinnah Hospital, Lahore, Pakistan
[2]Department of Community Medicine, Allama Iqbal Medical Lahore, Pakistan

**Received:** 26 September, 2018
**Accepted:** 04 October, 2018
**Published:** 05 October, 2018

***Corresponding author:** Muzaffar Ali, Associate Professor of Cardiology. Department of Cardiology, Allama Iqbal Medical College/Jinnah Hospital, Lahore, Pakistan, E-mail: mzra750@hotmail.com

**Keywords:** Arrhythmias; Ventricular arrhythmias; Hypokalemia; Serum potassium levels; Myocardial infarction

https://www.peertechz.com

Check for updates

Research Article

# Frequency of Ventricular Arrhythmias in Acute Myocardial Infarction and its relationship with Hypokalemia

## Abstract

**Introduction:** Arrhythmic complications of acute myocardial infarction like ventricular arrhythmias are common and determine the clinical outcome. The associated risk factors like potassium level may help triage the patients to reduce mortality.

**Objective**: Objectives were to determine the frequency of ventricular arrhythmias in acute myocardial infarction and to compare the frequency of ventricular arrhythmias in normokalemic and hypokalemic patients.

**Study design:** Cross-sectional survey

**Study setting:** Study was conducted in Department of Cardiology, Jinnah Hospital, Lahore.

**Duration of study:** Study duration was six months i.e. from 1st February 2018 to 31st July 2018.

**Subjects & Methods:** Using consecutive sampling, 370 patients with acute myocardial infarction were included. Development of ventricular arrhythmias was recorded. Rate of development of arrhythmias among normokalemic (serum potassium levels between 3.5mEq/L to 5.0mEq/L) at presentation and hypokalemic was compared. All enrolled patients received standard medical therapy for MI. History of hypertension and smoking was also elicited.

**Results:** 370 patients were included with mean age of 54.5 ± 9.2 years ranging from 40 to 70 years of age. In our study the frequency of ventricular arrhythmias came out only 16.5%. 21.9% patients with hypokalemia developed ventricular arrhythmias after acute myocardial infarction as compared to 11.4% normokalemic patients (p value< 0.001). There was no significant effect of being older in age, any gender, and hypertensive in our sampled population. Being smoker was significantly associated with development of arrhythmia.

**Conclusion:** It is concluded that patients with hypokalemia are at greater risk of developing ventricular arrhythmias after acute myocardial infarction.

## Introduction

An estimated 7.3 million deaths occurred in 2008 due to coronary artery disease / myocardial infarction (MI) having over 80% in low and middle-income countries without gender discrimination [1,2]. Great progress has been made so far in reducing the mortality but a great menace that still exists is sudden cardiac death [3]. Skeletal muscles, the major pool play an important role can promote moment of potassium into the stores, leading to decreased serum potassium levels within seconds to minutes in acute MI. Different reasons of sudden death are postulated including serum potassium imbalance leading to arrhythmia [4,5].

To define the hypokalemia, the cut off value of serum potassium level is less than 3.5 mEq/L. In a study it was conducted in patients with hypertension, acute MI and heart failure, the frequency of hypokalemia was around 17% [6]. This low serum potassium level has strong correlation with arrhythmias in patients of acute myocardial infarction especially within first 24 hours of presentation. In a retrospective study, the rate of ventricular arrhythmias during first 24 hours of acute MI was 27.3% in patient with hypokalemia while it was 7.5% in patient with normokalaemia, a statistically significant difference (P < .001) [7].

Patients with MI are usually followed over 72 hours for any



**Citation:** Ali M, Umer M, Butt UM, Tawwab S, Qureshi MA, et al. (2018) Frequency of Ventricular Arrhythmias in Acute Myocardial Infarction and its relationship with Hypokalemia. J Cardiovasc Med Cardiol 5(4): 036-038. DOI: http://doi.org/10.17352/2455-2976.000068.

post thrombolytic event. In a developing country like ours, it is mandatory to stratify the patients with greater chances of post MI complications so we may prepare our setting for any emergency especially in secondary care hospitals with lesser facilities. The rationale of this study is that there is no local study available in last 10 years and ethnicity is a risk factor for hypo or hyperkalemia [8]. Current study will determine the frequency of arrhythmia after MI and its relation with hypokalemia. This study will not only help physician to decide who to declare high risk but also save patient's life from arrhythmias which are usually fatal.

## Objective

### Objectives of this study were

- To determine the frequency of ventricular arrhythmias in acute myocardial infarction.
- To determine the frequency of ventricular arrhythmias in normokalemic and hypokalemic patients presenting with acute myocardial infarction.

## Materials & Methods

A cross sectional survey was done at Department of cardiovascular medicine and interventional Cardiology, Jinnah Hospital Lahore from 1st February 2018 to 31st July 2018. A total of 370 consecutive patients between 40-70 years of age of either gender presenting with diagnosis of myocardial infarction in 24 hours, admitted in emergency department were enrolled in the study after obtaining informed consent. Every patient of acute MI included in this study was given current standard medical therapy. Serum potassium levels were checked in these patients before treatment at presentation. Under aseptic conditions phlebotomy was done and 5 ml blood was drawn for potassium level at the time of presentation. Any ventricular arrhythmia was confirmed on ECG within 24 hours after the presentation. All patients were classified according to their potassium levels. Any ventricular arrhythmia was noted. Statistical Package for the Social Sciences (SPSS) version 19 software was used for the analysis of the data. Numerical variables like age and serum potassium levels were described as means and standard deviations, while categorical variables like gender, ventricular arrhythmia and smoking were described as frequencies and percentages. Data was stratified for age, gender, hypokalemia and normokalaemia versus development of ventricular arrhythmias. Chi square test was used to compare the frequency of ventricular arrhythmias in hypokalemic and normokalemic patients presenting with myocardial infarction, post stratification. Significant p value in this study was < 0.05.

## Results

In this study we enrolled 370 patients with mean age of 54.55 ± 9.230. (range 40 to 70 years). 271 patients (73.2%) were male and 99 (26.8%) were female. 61 patients (16.5%) out of 370 had Arrhythmias and rest of 309 (83.5%) did not have Arrhythmias. 178 patients (48.1%) were having Hypokalemia. When we cross tabulated gender with arrhythmias, using chi square test showed up with non-significant results (p=0.171) that described arrhythmias was equally distributed in males and females of our sampled population. On cross tabulating current smokers with Arrhythmias, 11 patients with Arrhythmias were currently smoking. When we applied Pearson chi square test it was resulted significant (p=0.001). However, when we cross tabulated Hypokalemia with Arrhythmias and used Pearson chi square test, results were statistically significant (p=0.007). 39 hypokalemia patients had Arrhythmias (Tables 1,2).

**Table 1:** Demographic and clinical parameters of subjects

| Variables n= 370 | Frequency | Percent |
|---|---|---|
| Age Min=40, Max= 70 Mean = 54.55, SD= 9.230 | | |
| < 55 year | 180 | 48.6 |
| > 55 years | 190 | 51.4 |
| Gender | | |
| Male | 271 | 73.2 |
| Female | 99 | 26.8 |
| Arrhythmias | | |
| Yes | 61 | 16.5 |
| No | 309 | 83.5 |
| Hypokalemia | | |
| Yes | 178 | 48.1 |
| No | 192 | 51.9 |
| Current Smoker | | |
| Yes | 27 | 20.9 |
| No | 293 | 79.1 |

**Table 2:** Cross tabulation between arrhythmias and risk factors.

| Variables | | Arrhythmias | | Total | P value |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Current Smoker | Yes | 11 | 16 | 27 | 0.001 |
| | No | 50 | 293 | 343 | |
| Hypokalemia | Yes | 39 | 139 | 178 | 0.007 |
| | No | 22 | 170 | 192 | |

## Discussion

Great progress has been made so far in reducing the mortality but a great menace that still exists is sudden cardiac death [3]. Different reasons of sudden death are postulated including serum potassium imbalance leading to arrhythmia [4,5]. Ventricular arrhythmias were found to present in the initial 24 hours of acute MI and heart failure [6]. Hypokalemia was found very much related to arrhythmias in patients with acute especially in the first 24 hours [3,7].

In our study the frequency of ventricular arrhythmias came out only 16.5%. This implies that the ventricular arrhythmias are common in our population presenting with acute myocardial infarction. This outcome is comparable with international studies. In a previous study, the frequency of ventricular arrhythmias in patients with acute MI was found to be17% [6].



**Citation:** Ali M, Umer M, Butt UM, Tawwab S, Qureshi MA, et al. (2018) Frequency of Ventricular Arrhythmias in Acute Myocardial Infarction and its relationship with Hypokalemia. J Cardiovasc Med Cardiol 5(4): 036-038. DOI: http://doi.org/10.17352/2455-2976.000068.

To determine the association between hypokalemia (Serum potassium levels <3.5mEq/L) and ventricular arrhythmias in patients of acute MI, we cross tabulated data. Results were statistically highly significant (p value < 0.001). 39 hypokalemia patients had arrhythmias.

Arrhythmias have been labeled to be a common cause of sudden cardiac death [9,10]. In a developing country like ours, it is mandatory to stratify the patients with greater chances of post myocardial infarction complications so we may prepare our setting for any emergency especially in secondary care hospitals with lesser facilities. It may safely be said that all patients with serum potassium levels <3.5mEq/L at presentation are at risk of developing ventricular arrhythmias after acute myocardial infarction.

In our study population, mean age of the patients was 54.55 ± 9.230 years (range 40 to 70 years). When we cross tabulated age group with arrhythmias, results were non-significant (p value=0.123) that depicted that development of arrhythmias is not dependent on age groups. Similarly, development of ventricular arrhythmias after acute myocardial infarction was independent of gender

Above results imply that more preventive efforts are required to reduce the burden of ischemic heart disease by controlling risk factors. The only limitation of our study was its cross sectional study design without measuring the terminal outcome like in hospital mortality and major adverse cardiac events.

## Conclusion

It is concluded that in our sampled population only 61 patients (16.5%) out of 370 had developed ventricular arrhythmias after acute MI. 21.9% patients with hypokalemia developed ventricular arrhythmias after acute myocardial infarction as compared to 11.4% normokalemic patients.

## References


1. World Health Organization (2013) Global atlas on cardiovascular disease prevention and control. Geneva, World Health Organization, 2011. Available on. Link: https://goo.gl/ipHUjK
2. World Health Organization (2013) Cardiovascular diseases Fact sheet N°317. Updated March 2013. WHO. Available on. Link: https://goo.gl/EZhk3q.
3. Kjeldsen K, Atar D, Hallén J, Vardas P, Zannad F, (2010) Haunsø S.Sudden cardiac death – the challenge to cardiology. FundamClinPharmacol. 24: 535-7. Link: https://goo.gl/rBT14Q
4. Kjeldsen K (2010) Hypokalemia and sudden cardiac death. ExpClinCardiol. 15: 96-99.
5. Clausen T (2010) Hormonal and pharmacological modification of plasma potassium homeostasis. FundamClinPharmacol. 24: 595-605. Link: https://goo.gl/EA6y2d
6. Pitt B, Bakris G, Ruilope LM, DiCarlo L, Mukherjee R (2008) EPHESUS Investigators Serum potassium and clinical outcomes in the eplerenone post-acute myocardial infarction heart failure efficacy and survival study (EPHESUS) Circulation. 118: 1643–50.
7. Su J, Fu X, Tian Y, Ma Y, Chen H, et al. (2012) Serum potassium on admission to the emergency department may be used as a valuable predictor. Am J Emergency Med. 30:1089-94.
8. Unwin RJ, Luft FC, Shirley DG (2011) Pathophysiology and management of hypokalemia: a clinical perspective. Nature Reviews Nephrology. 7:75-84. Link: https://goo.gl/ABM61r
9. McGovern PG, Jacobs DR Jr, Shahar E (2001) Trends in acute coronary heart disease mortality, morbidity, and medical care from 1985 through 1997: the Minnesota heart survey. Circulation. 104:19-23. Link: https://goo.gl/icu3W6
10. Adabag AS, Therneau TM, Gersh BJ (2008) Sudden death after myocardial infarction. JAMA. 300: 2022-25.






**Citation:** Ali M, Umer M, Butt UM, Tawwab S, Qureshi MA, et al. (2018) Frequency of Ventricular Arrhythmias in Acute Myocardial Infarction and its relationship with Hypokalemia. J Cardiovasc Med Cardiol 5(4): 036-038. DOI: http://doi.org/10.17352/2455-2976.000068.